BTEC Assignment Brief

Qualification	Pearson BTEC International Level 3 Qualifications in Engineering
Unit number and title	**Unit 59: Principles of Electrical Machines**
Learning aim(s)	C: Investigate how electrical machine control circuitry and systems operate safely
Assignment number and title	3: Electrical machine control circuitry and systems
Assessor	
Issue date	
Hand in deadline	

Vocational Scenario or Context	You work as an apprentice in a small engineering company that carries out maintenance activities on a range of electrical machines on behalf of manufacturers. Your Supervisor has asked you to investigate and to produce a detailed information pack related to: a) health and safety requirements for the safe operation of electrical machines and b) how electrical machine control circuitry and systems operate. Your Supervisor has asked you to do this so the manufacturers can refer to this information when discussing the types of maintenance undertaken by your company.

Task 1	**You need to research:** • the key features of regulations and directives related to the safe operation of electrical machines • guidance notes for electrical test equipment, including those related to safe isolation procedures and the need for live working • relevant codes of practice issued for specialist industries • control circuitry and systems for applications of DC electrical machines • control circuitry and systems for applications of AC electrical machines. **You must then:** Produce a risk assessment on a suitable template that covers the operation of a DC electrical machine and an AC electrical machine. Your risk assessment should include: • information on hazards that are likely to cause injury or adverse effects to operatives or others • an investigation of risks, with regards to severity of hazards through the use of a risk rating based on severity and likelihood of injury or adverse effect • information about control measures that will reduce the severity of risks. **You then need to:** Evaluate your risk assessment against possible alternative approaches, including those found in locally produced risk assessments (for example, at school or college), detailing how each complies with relevant and specific regulations

	and guidance notes. As part of this, you must: • justify how you have determined the risk rating for each of the identified hazards and how you selected the control measures • cover the practicalities of implementing the control measures • refer to efficiency or reducing the impact on the operator. **You must also:** Evaluate the relative merits of using different control circuitry and systems for **two** applications of DC electrical machines and **two** applications of AC electrical machines and how they impact on safe and efficient operation. For **each** application, you must: • compare and contrast the advantages and limitations of the existing control circuitry and systems and of using other possible control circuitry and systems • provide detailed and justified reasons as to which control circuitry and systems are the most effective and efficient, by referring to the specific requirements of the application. In addition, you must cover the following for the applications of DC electrical machines: • the operation of at least two speed control methods • how the starting circuitry operates in each application to avoid a large spike in current on start-up created by the absence of back electromotive force • other control circuitry in each application, such as overload protection, short circuit protection, interlocks and trips and how these devices are connected to the control circuitry. You must also cover the following for the applications of AC electrical machines: • the operation of at least three types of single-phase AC motor starting circuits • the operation of at least two three-phase starter circuits • other control circuitry in each application, such as overload protection, short circuit protection, interlocks and trips and how these devices are connected to the control circuitry.
Checklist of evidence required	• A detailed report/information pack that includes a risk assessment covering health and safety requirements for the safe operation of electrical machines and how DC and AC electrical machine control circuitry and systems operate.

Criteria covered by this task:	
Unit / Criteria reference	To achieve the criteria you must show that you are able to:
59 / C.D3	Evaluate the suitability of control circuitry and systems for DC and AC electrical machines, including how they impact on safe and efficient operation
59 / C.M3	Analyse why control circuitry and systems are used for DC and AC machines, fully preparing for the safe operation of the electrical machines
59 / C.P6	Produce an adequate risk assessment for the operation of a DC electrical machine and an AC electrical machine safely
59 / C.P5	Explain the operation of starting circuits and other control circuitry for AC electrical machines
59 / C.P4	Explain the operation of speed control methods and other control circuitry for DC electrical machines
59 / C.P3	Describe adequately how one regulation and one guidance note relate to the safe operation of electrical machines
Sources of information to support you with this Assignment	Books Sahdev S - *Electrical Machines* (Cambridge University Press, 2017) ISBN 9781108431064 Edwards J - *Electrical Machines and Drives* (Palgrave Macmillan, 1991) ISBN 9780333536513 Bateman M - *Tolley's Practical Risk Assessment Handbook* (Routledge, 2015) ISBN 9781138174405 Websites www.electricaleasy.com/p/electrical-machines.html www.electrical4u.com/ www.electricalclassroom.com/electric-machines/ www.hse.gov.uk/electricity/standards.htm www.hse.gov.uk/pubns/indg163.pdf https://www.hse.gov.uk/simple-health-safety/risk/risk-assessment-template-and-examples.htm
Other assessment materials attached to this Assignment Brief	Risk assessment template